STORMWATER MANAGEMENT OPERATIONS AND MAINTENANCE MANUAL

9534 WELLINGTON ROAD 22 (HILLSBURGH RIDGE SUBDIVISION)

TOWN OF ERIN

PREPARED FOR:

THOMASFIELD HOMES LIMITED

PREPARED BY:

C.F. CROZIER & ASSOCIATES INC.
2800 HIGH POINT DRIVE, SUITE 100
MILTON, ON L9T 6P4

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CROZIER

Revision Number	Date	Comments
Rev.0	February 2026	Issued for 2nd Draft Plan Submission

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1.0 Introduction

C.F. Crozier & Associates Inc. (Crozier) was retained by Thomasfield Homes Limited (the 'Owner') to undertake the detailed engineering design in support of the Hillsburgh Ridge Subdivision (the 'Subject Lands'), located at Lot 23, Concession 7 in the Town of Erin, County of Wellington. As part of the detailed design, a stormwater management (SWM) wet pond facility was proposed to accommodate runoff from the subdivision, as detailed within the *Functional Servicing Report* (dated February, 2026). The following report provides a stand-alone Operations & Maintenance manual outlining the operation and maintenance procedures for the subject stormwater management pond.

The Operations and Maintenance (O&M) Manual applies to the stormwater management services and facilities within the subdivision. This manual will help guide the Town of Erin staff once ownership of the Subject Lands and associated stormwater infrastructure is assumed. Prior to the shift of ownership, Thomasfield Homes Limited and their Contractor/Consultant are responsible for the operation and maintenance of the stormwater infrastructure (the works).

Prior to the lands being assumed by the Town of Erin, the list of contacts to be contacted regarding the operation and maintenance of the works is shown in Table 1.

Table 1: Operations and Maintenance Contact List

Name	Email	Telephone
Thomasfield Homes Limited	TBD	TBD
C.F. Crozier & Associates	tfraser@cfcrozier.ca	548.708.0023
Contractors, retained by Thomasfield Homes	TBD	TBD

2.0 Site Description

The Subject Lands cover an area of approximately 14 ha and currently consists of a vacant agricultural field. The Subject Lands are bounded by future development lands north and east, agricultural land to the west, and Wellington Road 22 to the south. There is an existing woodlot east of the site which is managed by the Credit Valley Conservation Authority and is included in the West Credit River Wetland Complex and Erin Branch of the Credit River. According to the Credit Valley Conservation Authority regulation mapping, the Subject Lands are located within a Credit Valley Conservation Authority regulated area, specifically the easterly boundary.

According to the Draft Plan of Subdivision (GSP, October 19, 2025), there will be one (1) stormwater block included in the Subject Lands, and associated stormwater servicing.

The following documents were referenced during the preparation of this manual:

- Ministry of the Environment (2003). Stormwater Management Planning and Design Manual 2003 – Chapter 6.
- USEPA, 1999. Storm Water O&M Fact Sheet: Catch Basin Cleaning.

3.0 Stormwater Management Pond

A total 10.90 ha drainage area is tributary to the stormwater management pond (including external areas), with an average imperviousness of 58%. Refer to Figure C002 enclosed with this report, depicting the post-development drainage areas. The Level 1 Enhanced protection storage volume requirement for 58% impervious is 197 m^3/ha; of the volume requirement, 40 m^3/ha is the extended detention, which leaves 157 m^3/ha as the permanent pool requirement to achieve 80% removal of total suspended solids (TSS). Thus, a permanent pool volume of 1,711 m^3 is required. The proposed stormwater management pond design provides a total permanent pool volume of 1,952 m^3 and is, therefore, sufficiently sized to provide 80% removal of Total Suspended Solids.

The stormwater management system has been designed to convey and attenuate flows up to and including 100-year storm events. The following sections highlight proposed approaches in the stormwater management design.

3.1 Conveyance Controls

The conveyance controls will be provided through municipal maintenance of the storm sewers, regular cleanout of manholes, and catch basin sumps will ensure that heavy sediment deposited in the sewer system after storm events are cleared out.

3.2 End-of-Pipe Controls

Based on the **Draft Plan of Subdivision** (GSP, October 19, 2025), the stormwater facility, located in the eastern corner of the property, adjacent to the existing woodland. The stormwater management facility will have one (1) outlet and will maintain the pre-development drainage patterns for the Subject Lands. The 600 mm outlet pipe will discharge to the existing Wellington Road 22 roadside ditch and ultimately to the Erin Branch of the Credit River, downstream of the Subject Lands. A 375 mm reverse-slope pipe conveys flows to the outlet control structure , where a 100 mm diameter orifice controls the extended detention within the pond.

The proposed stormwater management facility has been designed as a wet pond facility with a forebay and permanent pool to provide the required water quality requirements per the MECP design guidelines. There will be a reverse draw outlet for the 4-hour 25mm storm event to draw cooler water from deeper parts of the facility prior to out letting to Wellington Road 22 roadside ditch.

The proposed outlets will provide 48-hour extended detention for the 4-hour 25mm design storm according to the Credit Valley Conservation Authority (CVC) requirements.

Drawing C701 and C702 enclosed with this report depicts details of the stormwater management pond and outlet structures.

3.3 Water Quality Treatment Devices

The proposed SWM facility has been designed to remove 80% of TSS from the contributing stormwater runoff. The required water quality volume is based on the overall imperviousness of the contributing area, which is 58% for the contributing 10.90 ha catchment area. Using Table 3.2 from the MECP SWM Planning and Design Manual, the total required water quality storage volume (permanent pool and extended detention) is equal to 191 m^3/ha. A summary of the water quality calculations for the SWM pond is shown in Table 13.

Table 2: SWM Pond Water Quality Summary

Description	Value
Catchment Area	10.90 ha
Imperviousness	58%
MECP Total Water Quality Volume	197 m^3/ha
MECP Permanent Pool Volume	157 m^3/ha
Permanent Pool Volume Required	1,711 m^3
Permanent Pool Volume Provided	1,952 m^3

Runoff from Catchment 204, consisting of a portion of the multiple residential block, sewage pumping station, and internal road-right-of way at the entrance to the site, cannot be directed into the SWM pond inlet due to grading constraints. An Oil/Grit Separator (OGS) will be proposed to provide quality treatment of runoff from this area prior to discharging from the property. Sizing for an OGS unit to treat runoff from this catchment will be completed at the detailed design stage. Remaining catchments which do not drain to the pond are comprised of residential roofs and landscaped areas, which are considered as inherently "clean" runoff. As such, no additional quality treatment is proposed for these uncontrolled areas draining via sheet flow.

4.0 Inspection Schedule

A minimum of one inspection per year is required for the Hillsburgh Ridge Subdivision. Inspection reports prepared during the maintenance period shall be provided by the developer/consultant to the Town prior to the Town assuming ownership for their records.

The following inspection and maintenance activities are recommended to ensure the function of the stormwater management system.

4.1 Storm Maintenance Holes and Catch basins Visual Inspection

Per Table 2, the storm system and catch basins and maintenance holes should be inspected semi-annually until construction activities are completed. Once construction has finished, the maintenance holes and catch basins should be inspected annually to monitor sediment, debris, and trash buildup and overall condition of the structures. Based on visual inspection, additional maintenance measures may be recommended.

Table 3: Frequency of Inspection for Storm Maintenance Holes and Catchbasins

Component	Frequency of Inspection
Storm Maintenance Holes	Annually, preferably in the Spring season. Inspection frequency may be subject to change as required (ex. during construction or due to a blockage concern).
Catch Basins	Annually, preferably in the spring season. Inspection frequency may be subject to change as required (ex. during construction or due to a blockage concern).

Visual inspection will be the primary inspection method for identifying existing or potential issues. Sediment accumulation will be measured via a riser pipeline using a dip tube and foot valve/sludge judge; the presence of oil will be determined through oil inspections using a dip stick. Temporary traffic control measures will be required for a safe working zone due to proximity of catch basins and storm maintenance holes to active roadways. Equipment such as pole-mounted cameras can be inserted into maintenance holes, catch basins, and oil/grit separators to observe the inlet and outlet sewers for the structural and hydraulic conditions of the infrastructure without needing to enter the confined space.

Inspection records prepared by the developer/consultant shall be provided to the Town prior to assumption of ownership for their records.

4.2 Stormwater Management Facility Visual Inspection

Per Table 3, the stormwater management facility and all inlets, outlets, catch basins, and weirs should be inspected semi-annually until construction activities are completed. Once construction has finished, the stormwater management pond should be inspected annually to monitor sediment, debris, and trash buildup to ensure functionality of the facility.

Table 4: Frequency of Inspection for Stormwater Management Facility Components

Component	Frequency of Inspection
Inlets	Annually, preferably in the Spring season. Inspection frequency may be subject to change as required (ex. after heavy rainfall, sanitary overflows, or due to sediment concerns).
Stilling Basin	Annually, preferably in the Spring season. Inspection frequency may be subject to change as required (ex. after heavy rainfall, sanitary overflows, or due to sediment concerns)
Outlet	Annually, preferably in the Spring season. Inspection frequency may be subject to change as required (ex. after heavy rainfall, sanitary overflows, or due to sediment concerns)
Overflow Weir	Annually, preferably in the Spring season. Inspection frequency may be subject to change as required (ex. after heavy rainfall, sanitary overflows, or due to sediment concerns)
Permanent Pool	48 hours after every significant rainfall for the first two (2) years, annually after the first two (2) years. Inspection frequency may be subject to change as required (ex. upstream development).
Water Quality Treatment Devices	To be provider by manufacturer upon receipt of device documentation.

Visual inspection will be the primary inspection method for identifying existing or potential issues. Verification of extended drawdown time will be measured 48 hours after a significant rainfall to determine if the pond level has receded to normal permanent pool elevation.

Based on the results of the visual inspection, additional maintenance activities may be required.

Please refer to the Stormwater Facility Inspection Checklist (Appendix A). Inspection reports prepared by the developer/consultant during the maintenance period shall be provided to the Town prior to the assumption of ownership for their records.

4.3 Sediment Loading Rates

According to Table 6.3 of the Ministry of Environment (MOE) SWM Planning & Design (SWMPD) Manual, the yearly sediment loading for 58% imperviousness is 2.08 m^3/ha of drainage area, resulting in 22.67 m^3/year of sediment accumulation for the 10.90 ha area (see Table 4) (2.08 m^3/ha x 10.90 ha = 22.67 m^3/year).

Table 5: Resultant Annual Sediment Loading

Area (ha)	**Imperviousness** (%)	**Annual Loading** (m3/ha)	**Annual Loading** (m3/year)
10.90	58	2.08	22.67

Two (2) approaches were considered for calculating the cleanout frequency of the pond. The first calculates the number of years of sediment accumulation that would reduce the sediment forebay volume by 50%, and the second calculates the number of years of sediment accumulation that would reduce the overall permanent pool's TSS removal efficiency by 5% from 80% to 75%.

4.3.1 Reduction of Sediment Forebay Volume by 50%

The sediment forebay should be able to accumulate sediment for at least 10 years before its volume is reduced by 50% and cleanout is required. The pond provides a sediment forebay volume of 480 m^3. Based on the estimated sediment loading rate, established in Section 5.1 above, it would take approximately 15 years before the sediment forebay volume is reduced by 50% to 240 m^3 (see Table 5) (480 m^3/ 22.67 m^3/year = 21 years).

Table 6: Years to Reduce Sediment Forebay Volume by 50%

Annual Loading (m3/year)	**Sediment Forebay Volume** (m3)	**50% Sediment Forebay Volume** (m3)	**Years to Reduce Sediment Forebay Volume by 50%** (Years)
22.67	480	240	21

4.3.2 Reduction of TSS Removal Efficiency by 5%

The stormwater management pond was designed to provide Enhanced (Level 1) Protection as defined by the Ministry of the Environment, Conservation, and Parks (MOECP) Stormwater Management Planning and Design Manual (2003), requiring an 80% removal of Total Suspended Solids (TSS). Therefore, reduction of the sediment removal efficiency by 5% would result in an overall 75% TSS removal efficiency being provided by the stormwater management pond. Interpolating between the values provided in MOECP Table 3.2, a 75% TSS removal efficiency (for a tributary drainage area with a 58% imperviousness) requires a 197 m^3/ha storage volume. Since 40 m^3/ha of this storage volume is to be accommodated by the extended detention portion of the pond, the remaining 157 m^3/ha storage volume requirement is to be provided within the permanent pool portion of the pond. As such, a 2,147 m^3 permanent pool volume (10.90 ha x 157 m^3/ha = 1,711.3 m^3) would provide a 75% TSS removal.

The stormwater management pond provides a total 1,952 m^3 permanent pool volume. Therefore, for the TSS removal efficiency to be reduced by 5% (to an overall 75% TSS removal efficiency), the permanent pool volume would need to be reduced by 1952 m^3 (1,952 m^3 – 1,711 m^3 = 241 m^3). Based on the annual sediment loading rate of 22.67 m^3/year, it would take approximately 10 years for the permanent pool volume to be reduced such that a 5% reduction in TSS removal efficiency occurs.

4.4 Recommended Clean-out Frequency

Based on calculations presented in Section 5.3.1 above, it would take approximately 21 years for sediment accumulation to reduce the available pond forebay volume by 50%. Calculations presented within Section 5.3.2, determined that it would take approximately 10 years for sediment accumulation to reduce the TSS removal efficiency of the pond by 5%. Therefore, pond cleanouts should take place a minimum of once every 10 years to maintain both the volume capacity of the pond forebay and overall sediment removal capacity within the pond.

Additionally, a bathymetric survey should be completed in five-year intervals from the completion of the stormwater management pond construction to assess pond functionality and annual sediment accumulation rates to determine if the pond must be cleaned out more frequently.

4.5 Sediment Removal Operations

Prior to commencing maintenance and sediment removal operations, all applicable permits shall be obtained. For documentation purposes, a bathymetric survey should be completed before and after dredging the stormwater management pond.

During maintenance and sediment removal operations it is recommended that the pond forebay be dewatered using portable pumps to the normal water level of 436.50 m through the 300 mm reverse slope pipe. The invert of the pipe will be below the normal water level at 435.00 m. The pond forebay is to be pumped from the proposed dewatering sump, as shown on Drawing C701. If dewatering of the pond wet cell is required for maintenance purposes, the wet cell can be dewatered using pumps as well. Multiple sediment samples from different locations should be sent for analysis prior to starting cleanout operations to determine the appropriate disposal site.

Given that drying sediment may cause undesirable odours for the adjacent residential land uses, sediment should be removed from the pond by means of an excavator and loaded onto sealed dump trucks to be disposed of at an approved disposal site. Alternatively, sediment could be removed by use of a vacuum truck and disposed of at an approved disposal site. The use of polymer flocculants could reduce the trucking costs by significantly reducing the slump of the sediment.

5.0 Inspection & Maintenance

Maintenance is an important aspect of stormwater management pond performance. One of the main reasons for stormwater management pond failures and/or poor performance is a lack of regular maintenance and cleanout operations.

Maintenance of any component of the stormwater system should be logged in the Maintenance logbook (Appendix A). Maintenance logs prepared by the developer/consultant will be provided to the Town prior to the assumption of ownership for their records.

5.1 Inspections

During the first two (2) years of operation, the facility should be inspected after every significant storm event to ensure proper functioning [average is about four (4) inspections per year]. After this initial time period, and confirmation that the wet pond is operating as intended, frequency of inspections may be lessened to once per year (annually). However, if such factors such as upstream development occur, more frequent inspections may need to be carried out due to the potential operation problems this could incur. An inspection report should be filled out during each inspection and kept on file.

5.2 Maintenance Operations

Inspections determine the extent of required maintenance activities. Table 4.1 below (adapted from Table 6.1 of the MOECP Stormwater Management Planning and Design Manual, 2003) provides a checklist of typical operation and maintenances activities to be completed for the wet pond.

Table 7: Maintenance Checklist

Item No.	Operation or Maintenance Activity	Wet Pond	Table
1	Inspection	■	4x / year for 2 years; after 2 years inspect annually
2	Storm Maintenance Holes and Catch basin Maintenance	□	Annually
3	Stormwater Management Facility Maintenance	□	Annually
4	Grass Cutting	□	As Required
5	Weed Control	■	Annually
6	Upland Vegetation Replanting	□	As Required
7	Shoreline Fringe and Flood Fringe Vegetation Replanting	□	As Required
8	Aquatic Vegetation Replanting	□	As Required
9	Removal of Accumulated Sediments	■	Every 10 years
10	Trash Removal	■	Remove trash once during the spring, then based on observation
11	Security and Safety Measures	□	As Required
12	Vandalism, Illegal Access, and/or Encroachment	□	As Required

■ *Normally Required*

□ *May be Required*

5.3 Storm Maintenance Holes and Catch basin Maintenance

Based on the results of the visual inspection, the maintenance activities will be assessed on a case-by case basis.

Storm maintenance holes, catch basins and catch basin maintenance holes provide inlets for sediment, grit and debris into the storm sewer system. To avoid the structure from filling with grit and debris, conveying untreated flow and avoiding blockages, the basins should be regularly cleaned.

Catch basins may be manually cleaned or cleaned using specialized equipment such as vacuum trucks. Catch basin cleaning should be performed once the depth of the sediment reaches one-third of the depth of the catch basin to the invert of the outlet pipe for best practice. The frequency of cleaning required is dependent on the amount of grit, surface drainage, land use and winter control practices.

5.4 Stormwater Management Facility Maintenance

According to Section 6.4.2 Sediment Loading and Cleanout Frequency Stormwater Management Planning and Design Manual (MOE, 2003), the stormwater management facility should have the sediment accumulation cleared out every 10 years, subject to adjustment based on annual sediment depth inspections.

The permanent pool must be drained, to allow for the bottom of the forebay and outlet pool to be accessed. Once the bottom is exposed, grading/excavating equipment (long-reach excavator) will remove sediment from the facility and placed in an open area adjacent to the facility so that it can dry and testing can occur. If the test results yield that there is hazardous material present, the sediment must be deposited at a hazardous waste facility, otherwise dumped at the nearest landfill.

Once the clearing of any sediment buildup within the forebay and outlet pool has been completed, any required re-establishment of plantings should be done. The forebay and outlet pool should then be refilled with municipal water to minimize erosion during storm events following the cleanout.

If sediment removal and maintenance is required in the wetland portion of the stormwater management facility, the water level should be lowered to allow for maintenance. Only the forebay and outlet pool should be completely drained to reduce the impact to the aquatic and shoreline fringe vegetation within the other portions of the facility. Sediment removal within the stormwater management facility should be performed in dry weather conditions.

After significant rainfall events, the outlet structure, orifice controls, and water quality control structures should be inspected to verify if outflows are in accordance with the approved design.

5.5 Grass Cutting

It is recommended that grass cutting for the stormwater management facility is minimized or eliminated to allow for grass to grow, enhancing the water quality of the pond. Allowing the growth of vegetation around the pond discourages the presence of geese and other nuisance animal species by removing the potential for habitats. Grass within the boundary of the facility, created by the maintenance/walking path should only be cut once in the fall to create seed source and mulch.

If grass cutting is required by the Town of Erin, the grass around the stormwater management pond should not be cut to the edge of the permanent pool. As a safety precaution, cutting should be done parallel to the water with grass clippings being blown upland to reduce the potential for organic loadings to the pond.

5.6 Weed Control

Weeds are generally defined as any kind of vegetation which is unwanted in a particular area. Weeding should be done by hand to prevent the destruction of surrounding vegetation. The use of herbicides and insecticides should be prohibited near the stormwater management pond since they create water quality problems. The use of fertilizer should also be restricted to minimize the nutrient loading to the downstream receiving waters

5.7 Vegetative Planting

The maintenance of the upland and flood fringe plantings is generally limited as the vegetation is generally stable. These plantings include ground cover (grass, woody shrubs and trees) and if needed, should occur in the Spring.

Shoreline fringe areas are subject to harsher conditions and require more maintenance due to the frequent wetting and drying associated with the shoreline. A seed mixture with a soil nutrient medium and a biodegradable mesh-like blanket is recommended to establish ground cover within this area. Planting should be completed in mid-May to early June after the water levels have subsided to a stable level.

Aquatic plantings are the most difficult for initial establishment and often require re-planting within the first two years of the facilities operation. Young shoots are preferred for stability, rather than rhizomes or corms. The plants should be at least 10cm tall and planting should occur in late May to early June. Submerged rooted plants should be planted as mature vegetative growth if planted in late Spring to early summer to take advantage of the water and soil conditions.

5.8 Trash Removal

The removal of trash is an important practice for stormwater management maintenance as it can block the outlet structures and impact the proper function of the facility. Generally, a "spring clean-up" to remove trash from the stormwater management facility is acceptable.

5.9 Security and Safety Measures

The stormwater management facility is equipped with security and safety measures, such as bollards, fencing, railings, grates, and clearly visible warning signage indicating restricted access and potential hazards. Any broken security measures or signs hidden from vegetative overgrowth shall be restored to working condition to ensure the safety of the public.

These signs should include the following text:

WARNING

This stormwater management facility received runoff from the development, cleaning the water and releasing it back to the natural watercourse downstream. It is subject to rapid rise in water levels and high flow conditions. KEEP OUT/DO NOT ENTER.

Should any of these safety features be missing or damaged, they must be repaired or replaced immediately. Temporary barricades and fencing should be erected as needed to warn people of fall hazards during repairs.

5.10 Vandalism, Illegal Access, and/or Encroachment

The stormwater management facility shall be monitored for signs of vandalism, unauthorized access, and encroachment from adjacent properties. Visual inspections should include checks for graffiti, unauthorized trails, or evidence of dumping or tampering with outlet structures. Where encroachment is identified, appropriate measures such as signage, fencing, or Town notification may be required to restore the facility's intended function and maintain public safety.

6.0 Safety & Equipment

The following sections highlight the safety practices and information regarding the protocols, training and licensing requirements and the general use of equipment. More details on the safety and use of specialized equipment can be found in the applicable Ministry of Labour regulations and Contractor/Consultant specific Health and Safety Plans.

6.1 Training and Safety Requirements

Inspection crews are exposed to several challenging conditions in the field. Supervisors will be responsible for ensuring that all safety measures are followed in accordance with the Ministry of Labour (MOL), Standards Operating Procedures (SOPs) (as applicable) and company specific safety policies.

Personnel should be trained in the following areas before undertaking any work:

- Book 7 Traffic Protection and Plans
- Confined Space Entry Training and Certification
- Fall Protection and Working at Heights
- Atmospheric Monitoring and Ventilation Methods
- Personal Protective Equipment
- Worlplace Hazardous Material Information System (WHMIS)
- Construction Projects Regulation

Personnel should also be trained/notified of potential environmental hazards such as poison ivy, hogweed and ticks.

Confined space entries should not be attempted unless specifically directed and planned for by the Management.

6.2 Equipment

6.2.1 Personal Protective Equipment

Personal Protective Equipment (PPE) should be used based on the requirements and type of inspections being performed. The suggested PPE for work related to sanitary and storm sewers, maintenance holes, catch basins and culverts include the following:

- Hard hat
- Safety glasses
- Safety footwear
- Safety vest
- Gloves
- Fall Arrest
- Harness (for confined space entry)
- Ventilation or breathing apparatus (for confined space entry)

6.2.2 Hand Tools

The typically required hand tools by the inspection crew include the following:

- Pick-axe
- Sledge hammer
- Flashlight/mirror
- Debris retrieval device
- Sediment measuring and sampling device
- Traffic safety signage & control devices
- Other job specific tools/equipment (as required)

7.0 Response Plan

7.1 Spills and Pollution

Any release of a pollutant into the natural environment originating from a structure, vehicle, or other container that are abnormal is defined as a spill. Any spill should immediately be reported to the Management/Owner of the works, who should report the spill to the MECP Spills Action Centre (SAC) if the spill is likely to result in any of the following:

- Impairment to the quality of the environment (air, water or land)
- Injury or damage to property or animal life
- Adverse health effects
- Safety risk
- Making property, plant or animal life unfit for use
- Loss of enjoyment of normal use of property
- Interference with the normal conduct of business

7.2 Spill Prevention and Contingency Plan

The MECP is responsible for ensuring that the party responsible for a spill cleans up the site according to the Ministry guidelines. If a spill occurs, the SAC must be contacted immediately. A report documenting the spill should be submitted to the SAC and include the party contacted, the time and summary of the discussion. This information will be kept as reference to the spill.

Every incident involving a spill should be recorded and include the following:

- Date, time, location and duration of the release of the pollutant
- Identity of the pollutant released and Owner's name
- Quantity released
- Circumstances and cause of the spill
- Details of the containment and clean up efforts, the method used to dispose of or use the pollutant or any matter, thing, plant, animal or any part of the natural environment that is affected by the spill and location of the disposal site.

Contact information for spill notifications shall include the Management, Municipality, MECP Spills Action Centre and others as required:

Table 8: Spill Notification Contact List

Name/Organization	Address/Department	Telephone
Town of Erin	TBD	TBD

8.0 Record Keeping

All records and results of the inspections, cleaning and maintenance operations should be recorded in a logbook at the Owner's administration office for inspection by the Ministry.

9.0 Annual Maintenance Cost Estimates

The average annual operation and maintenance costs for the pond was calculated to be $10,720 (see Appendix B) which translates to $983.48/ha of drainage area. These costs were based on Table 7.5 of the MOECP 2003 SWMPD Manual, and do not include costs associated with surveying the sediment depths which would be required prior to sediment removal operations.

The bulk of the annual operation and maintenance cost is associated with the removal and disposal of sediment which would take place approximately once every 10 years, but budget provisions should be set on an annual basis to ensure the availability of funds at the time the cleanout is performed.

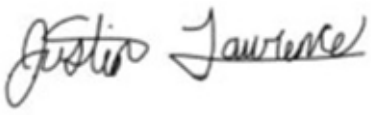
10.0 Conclusion

The implementation of a comprehensive operation and maintenance program is an integral part of the design of wet stormwater management pond and maintenance of minimum permanent pool volumes is required for the proper functioning of the facilities.

Inspections of the pond facility should be carried out after every significant storm event during the first two (2) years of operation and on a yearly basis after that period.

The recommended cleanout frequency for the stormwater management pond is 10 years, which is the time at which the TSS removal efficiency lowers by 5%. This will avoid large cleanout operations involving the whole pond.

C.F.CROZIER & ASSOCIATES INC.



Justin Lawrence, P.Eng.,
Project Engineer

C.F. CROZIER & ASSOCIATES INC.

Trevor Fraser, P.Eng.,
Project Manager

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APPENDIX A

Inspection and Checklist Forms

STORMWATER FACILITY INSPECTION CHECKLIST

Inspection Date: | **Contract No.:**

Asset Name: | **Asset ID:**

Current Weather on Site:

Previous Weather on Site:

Measured Data:

Water Level ____ m Sediment Levels

Accumulated in Bottom of Dry Pond: ____

Please note that any structures found to be worn, missing or damaged are to be repaired or replaced within 48 hours.

	Checklist:	Measure Condition			Comments / Action(s) Required
		Good	Fair	Poor	
1	Inspect the water level in the stormwater management facility. Is there water present in the dry pond?	☐	☐	☐	
2	Inspect the sediment level in the stormwater management facility. Is the sediment buildup impeding the function of the pond outlet pipe and/or overflow weir structures? Is the sediment depth allowing for standing water within the dry pond?	☐	☐	☐	
3	Is the vegetation around the pond unhealthy or dying?	☐	☐	☐	
4	Is there any indication of a spill? Is there an oily sheen on the water near the inlet or outlet? Is the water frothy? Is there an unusual coloring to the water?	☐	☐	☐	
5	Inspect the stormwater management facility for trash/litter and debris.	☐	☐	☐	
6	Inspect the pond bottom for any accumulated sediment or low points.	☐	☐	☐	
7	Inspect inlet swales for any accumulated sedimen, trash or debris.	☐	☐	☐	
8	Is there any noticeable damage to the pond structures (i.e. outlet structures, overflow weirs)?	☐	☐	☐	
9	Is there any noticeable damage to the grassed swales (i.e. erosion, blockages)?	☐	☐	☐	
10	Inspect the outlet structure. Is there sediment, trash/debris buildup at the outlet structure?	☐	☐	☐	
11	Inspect catch basin(s). Is there sediment, trash/debris buildup in the structure?	☐	☐	☐	

Maintenance

Pipe/Orifice Outlet to be inspected for and cleaned of any debris within 48 hrs of significant storm event

Overflow weirs to be inspected for and cleaned of any debris within 48 hrs of significant storm event

OVERALL REMARKS:

Signature of Inspector: _____

Site Location: Mitsubishi Chemical Advanced Materials Canada Inc. ("MCAMC Canada"), 495 Laird Road, Guelph, ON

MOE ECA No.: ECA No. 0631-BM7QS9

Operation, Maintenance, and Record Keeping Requirements[1]

- The Owner shall inspect and monitor the works as outlined in the Operations Manual Storm Water Management Works
- The Owner shall undertake an inspection of the condition of the Works, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the Works to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the Works, as applicable. The Owner shall also regularly inspect and clean out the inlet to and outlet from the Works to ensure that these are not obstructed.
- The Owner shall construct, operate and maintain the Works with the objective that the effluent from the Works is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.
- The Owner shall maintain a logbook to record the results of these inspections, any cleaning and maintenance operations undertaken and shall keep the logbook at the Owner's administrative office for inspection by the Ministry. The logbook shall include the following:
    a) the name of the Works;
    b) the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the Works.

1 – Specific operation, maintenance, monitoring and record keeping requirements to be undertaken in accordance with the ECA No. 0631-BM7QS9

Example Maintenance Log

Date	Inspection / Maintenance	Storm System Component(s) included in visit	Details of Activity (Type of Inspection, Item Inspected, Maintenance Actions, etc.)	Name of Inspector
Date	*Inspection*	*Loading dock catch basin*	*Visual Inspection, debris check*	*John Doe*

APPENDIX B

Operations and Maintenance Costs

CROZIER

Project No.: 1808-7463
Project Name: Hillsburgh
Date: 12-Nov-2025
Prepared by: JL
Checked by: TF

SWM Facility Operations & Maintenance Cost Estimate

Operation and Maintenace Costs Based on MOE SWM Planning & Design Manual Table 7.5 (2003)

	A		B	C	D	E
Type of Maintenance	**Maintenance Interval (yrs)**	**MECP Price (2003)**	**Unit Price (2025)**	**Unit**	**Quantity**	**Annual Cost = (B x D) / A**
Inspection and Inspection Report	1		**$ 1,800**	each inspection	1	**$ 1,800**
Litter Removal	1	$ 2,000	**$ 3,300**	ha	0.86	**$ 2,840**
Grass Cutting	1	$ 250	**$ 500**	ha	0.86	**$ 430**
Weed Control (hand extraction)	1	$ 2,500	**$ 4,100**	ha	0.86	**$ 3,530**
Vegetation Maintenance (Aquatic/ Shoreline Fringe)	5	$ 3,500	**$ 5,700**	ha	0.34	**$ 390**
Vegetation Maintenance (Upland/Flood Fringe)	5	$ 1,000	**$ 1,700**	ha	0.52	**$ 180**
Sediment Testing (incl. lab tests on quality)	10	$ 365	**$ 600**	each	1	**$ 60**
Sediment Removal (front end loader/excavator)	10	$ 15	**$ 100**	m^3	23	**$ 230**
Sediment Disposal (off-site landfill)	10	$ 300	**$ 500**	m^3	23	**$ 1,140**
Pervious Pipe cleanout (flushing)	10	$ 1	**$ 2**	m	193.5	**$ 40**
Pervious Pipe cleanout (radial washing)	10	$ 2	**$ 4**	m	193.5	**$ 80**
Allowance for Engineering Fees (Major Activities)	-		lump	lump	-	-

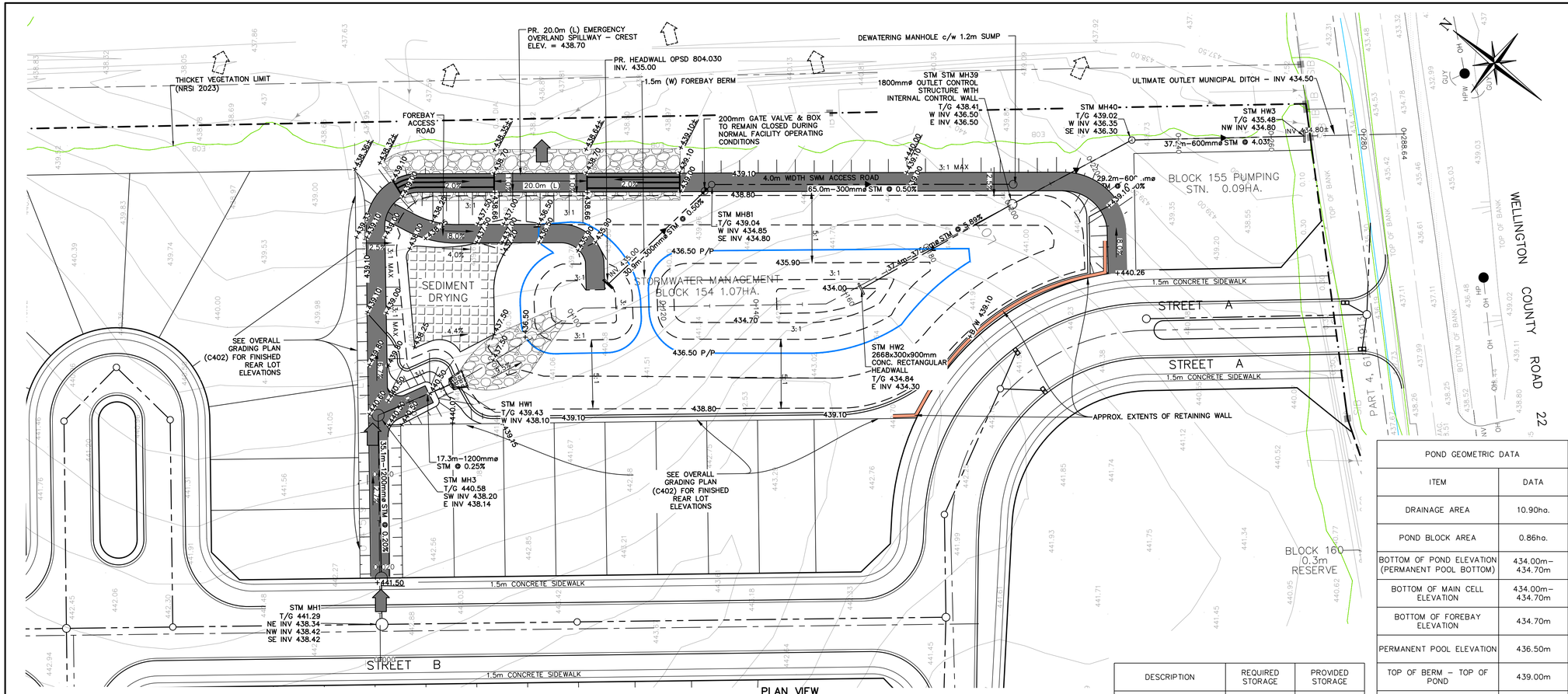
Total Annual Operation and Maintenance Costs = $ 10,720

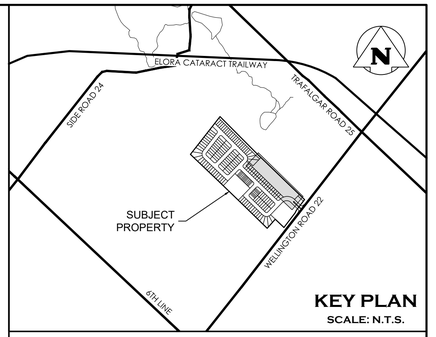
Note: Unit prices have been updated to reflect 2025 prices (percent change = 60.39%)

DRAWINGS

C701: SWM Plan & Profile

C702: SWM Sections & Details



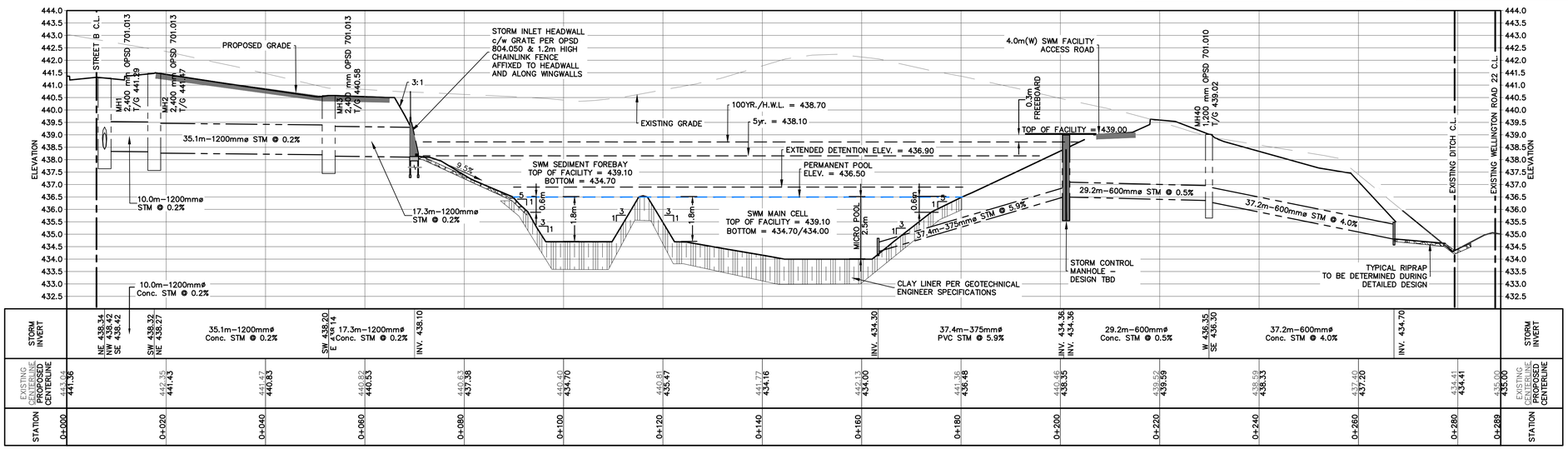


LEGEND

- PROPERTY LINE
- EXISTING CONTOUR (1.0m)
- PROPOSED SWM FACILITY CONTOUR
- PROPOSED SWM FACILITY PERMANENT POOL
- PROPOSED STORM SEWER & MANHOLE
- PROPOSED | EXISTING OVERLAND FLOW DIRECTION
- PROPOSED RIP RAP PLACEMENT
- PROPOSED DESIGNATED SEDIMENT DRYING AREA
- PROPOSED SWM ACCESS / FOREBAY ACCESS ROADS
- +438.75± PROPOSED MATCH TO EXISTING ELEVATION
- +439.10 PROPOSED ELEVATION
- 2.0% PROPOSED SLOPE GRADIENT
- PROPOSED SIDE SLOPE
- PROPOSED RETAINING WALL (ARMOUR STONE)

POND GEOMETRIC DATA	
ITEM	DATA
DRAINAGE AREA	10.90ha.
POND BLOCK AREA	0.86ha.
BOTTOM OF POND ELEVATION (PERMANENT POOL BOTTOM)	434.00m–434.70m
BOTTOM OF MAIN CELL ELEVATION	434.00m–434.70m
BOTTOM OF FOREBAY ELEVATION	434.70m
PERMANENT POOL ELEVATION	436.50m
TOP OF BERM – TOP OF POND	439.00m
100YR. ELEV	438.70
5YR. ELEV	438.10

DESCRIPTION	REQUIRED STORAGE	PROVIDED STORAGE
PERMANENT POOL EL 434.00 – 436.50	1,711 m^3	2,012 m^3
ACTIVE STORAGE EL 436.50 – 438.70	7,693 m^3	8,153 m^3



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SCALE: 1:100 (VERT.)

TEMPORARY BENCHMARKS

SITE BENCHMARK#1: MAGNETIC NAIL IN ASPHALT APPROX. 18m SOUTH OF SOUTH-WEST CORNER OF THE SUBJECT PROPERTY. ELEV=439.18m

SITE BENCHMARK#2: MAGNETIC NAIL IN ASPHALT APPROX 100m EAST OF SOUTH-WEST CORNER OF THE SUBJECT PROPERTY. ELEV=438.51m

SURVEY PREPARED BY VAN HARTEN SURVEYING INC.
PROJECT No: 23602-16
DATED: JAN. 16, 2023

No.	ISSUE	DATE: YYYY/MMM/DD
3	ISSUED BY GEI	2024/NOV/07
4	ISSUED FOR DRAFT PLAN APPROVAL	2025/DEC/12

Engineer

LICENSED PROFESSIONAL ENGINEER
T. A. H. FRASER
100176040
2025.12.12
PROVINCE OF ONTARIO

Engineer

LICENSED PROFESSIONAL ENGINEER
J.LAWRENCE
100583488
2025.12.12
PROVINCE OF ONTARIO

Project

HILLSBURGH RIDGE SUBDIVISION
9354 WELLINGTON ROAD 22,
TOWN OF ERIN, WELLINGTON COUNTY

Drawing

SWM PLAN & PROFILE

CROZIER CONSULTING ENGINEERS

Drawn By	Design By	Project
S.C.	S.C./J.L.	1808-7463
Check By	Check By	Drawing
J.L.	T.F.	C701

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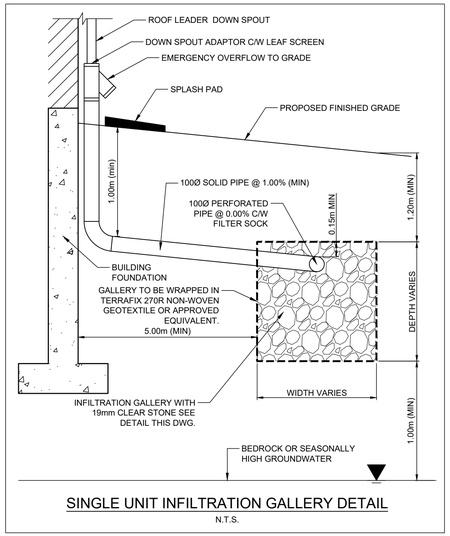
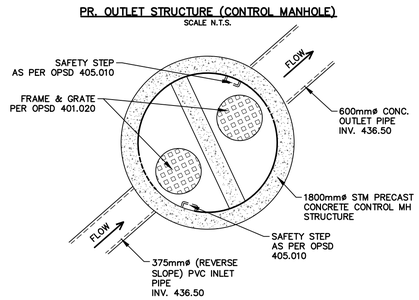


SINGLE UNIT INFILTRATION GALLERY DETAIL

N.T.S.



PR. OUTLET STRUCTURE (CONTROL MANHOLE)

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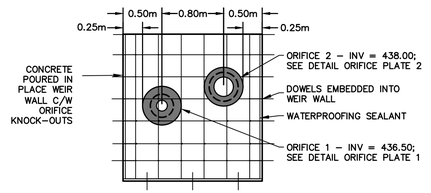

CONCRETE WEIR WALL DETAIL

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TYPICAL 1800mmø CONTROL MANHOLE (OUTLET STRUCTURE) CONFIGURATION

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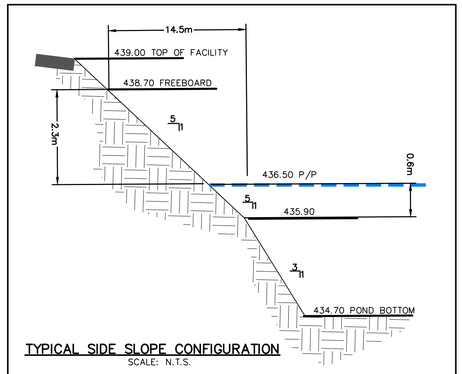

TYPICAL SIDE SLOPE CONFIGURATION

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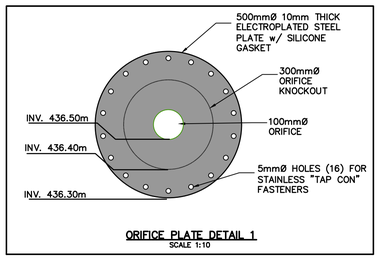

ORIFICE PLATE DETAIL 1

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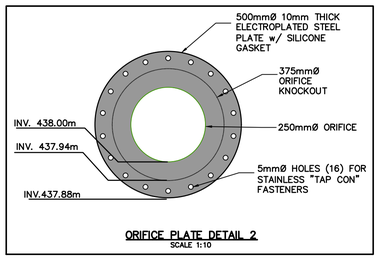

ORIFICE PLATE DETAIL 2

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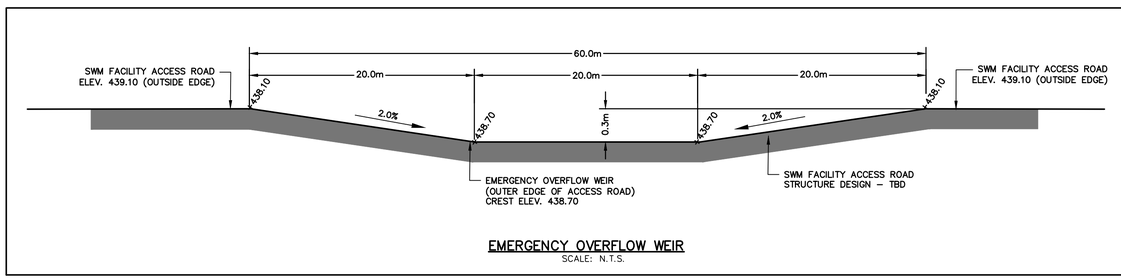
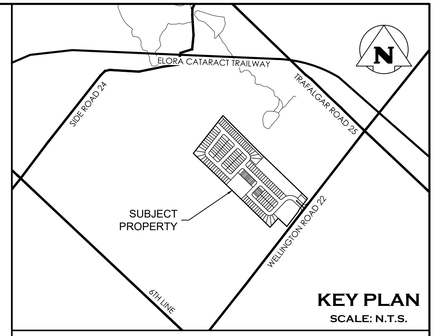


EMERGENCY OVERFLOW WEIR

SCALE: N.T.S.



KEY PLAN

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SWM SECTIONS & DETAILS

CROZIER
CONSULTING ENGINEERS

Drawn By	Design By	Project
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Check By	Check By	Drawing
J.L.	T.F.	C702

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